Using Generative AI to Drive Engineering Productivity in the Enterprise

Innovation is the life blood of the Tech revolution

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Jan 2024
About Krish Vitaldevara
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- Lives in Bay Area
- 25 years in the Tech Industry
- NetApp: Product and Engineering Leader
  - Core Platforms
- Ex-Google: Product Leader
  - Android and Play
  - Google Maps
- Ex-Microsoft: Product Leader
  - O365
  - Outlook.com
  - Microsoft consumer trust and safety teams
Agenda

• About NetApp

• AI/ML evolution
  • Gen AI is a gamechanger

• Engineering productivity
  • GenAI opportunities
  • Barriers to adoption
    • Security
    • Licensing

• Future Engineer
  • Responsible AI
About NetApp
NetApp at a glance

**Industry-leading cloud services**
- Cloud storage
- Compute operations
- Cloud controls
- Cloud services and analytics

**Industry-leading software and systems**
- Flash and hybrid storage
- Object storage
- Converged and hybrid cloud infrastructure
- Protection and security
- Enterprise solutions

**Industry-leading solutions with an open ecosystem of partners**
- Microsoft Azure
- Google Cloud
- AWS
- IBM Cloud
- NetApp
- Oracle
- Citrix
- SAP
- Red Hat
- Brocade
- Accenture
- Cognizant
- Fujitsu
- NVIDIA
- Commvault
- Veeam
- Rubrik
- Splunk

- **Global** cloud-led, data-centric software company
- **Industry-leading** software, systems, and cloud services
- **Founded in 1992**, headquartered in San Jose, California
- **11,000+ employees** and **4,000+ partners** helping organizations thrive in a hybrid multi-cloud world
- **Fortune 500 company** (NASDAQ: NTAP)

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Customers trust us to innovate in storage and data management

- Proven leader in all-flash storage
- Only storage OS natively available on the biggest clouds
- Best protection and security in the industry
- Revolutionary CloudOps services

NetApp helps companies take disruption in stride and turn it into powerful innovation, just like we’ve done ourselves for three decades
AI-driven growth

(AI will transform every business to leverage data)

2024’s will be remembered as a “Decade of AI”

1. Better BECAUSE of AI (Products built with AI/ML techniques)

2. Better THROUGH AI (Leverage AI/ML to build products)

3. Better FOR AI (Serve AI/ML workloads)
Generative AI
Generative AI is capable of generating new data based on context.

Generative AI’s impact on productivity could add trillions of dollars in value to the global economy. Our latest research estimates that generative AI could add the equivalent of $2.6 trillion to $4.4 trillion annually across the 63 use cases we analyzed—by comparison, the United Kingdom’s entire GDP in 2021 was $3.1 trillion.
Rapid evolution of GenAI

2018
Birth of generative AI models: GPT-1, GPT-2

2021
Models learn to code: Codex from OpenAI

2023
Human level coding skills: GPT4

Growing ecosystem of AI models, tooling, hosting and deployment options

Aug. 2021
Codex beta access

March 2023
ChatGPT access
GPT3.5 access
Azure OpenAI access
Evolution of OpenAI models

- Models got better at coding
- Then got better at following instructions
- Then got better at understanding follow-ups
- Then got cheaper
- Then feature gap between ChatGPT+ and paid API access started growing
  - Plugins
  - Multi-modal
  - Code interpreter, web browser
Why embrace Generative AI (e.g. OpenAI)

Shorter innovation cycle

Modernize automation infrastructure

Engineers spend more time on real code
Engineering Productivity
Typical Engineering Workflow
Metric expressed as percentage of engineer time

- Research: 20%
- Code: 30%
- Test: 15%
- Review: 10%
- Deploy: 10%
- Fix: 15%
AI-Augmented development

GenAI transforming all aspects of developer workflow

1. Design-to-Code Tools
2. Coding Assistants
3. Testing Tools
GenAI positively impacts all aspects of developer workflow

From conversational experience with investigations to automatic code generation there is huge potential
GenAI could improve overall developer experience

- In-IDE code suggestions
- Automatic comments
- Automatic documentation
- Code language translation

30% + GenAI =

- Faster Coding
- Improves readability
- Improves maintainability
- Improves usability
GenAI could help automate most of the unit tests

- Unit test automation

15% + GenAI = • Improve time to market
GenAI could help with codifying coding standards

- Finding Bugs
- Security Review
- Maintainability Advice
- Codify standards and suggestions

10%

GenAI

+ Review

= 

- Improved quality
- Improved security conscious
- Reduces maintenance cost
- Improves Clarity and Consistency
GenAI could reduce overall development time

- Fix suggestions
- Automates defect management

\[ 15\% + \text{GenAI} = \text{Faster coding} \]

\[ \text{Faster coding} + \text{Improves developer time on code and design} \]
Feedback from early adopters (with GitHub Co-pilot)

Developers seemed positive with the improvement in productivity thereby leading to more job satisfaction.

When using GitHub Copilot...

<table>
<thead>
<tr>
<th>Perceived Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am more productive</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Satisfaction and Well-being*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less frustrated when coding</td>
</tr>
<tr>
<td>More fulfilled with my job</td>
</tr>
<tr>
<td>Focus on more satisfying work</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Efficiency and Flow*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faster completion</td>
</tr>
<tr>
<td>Faster with repetitive tasks</td>
</tr>
<tr>
<td>More in the flow</td>
</tr>
<tr>
<td>Less time searching</td>
</tr>
<tr>
<td>Less mental effort on repetitive tasks</td>
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</tbody>
</table>

We recruited 95 developers, and split them randomly into two groups.

We gave them the task of writing a web server in JavaScript.

45 Used GitHub Copilot

78% 70% Finished

1 hour, 11 minutes average to complete the task

50 Did not use GitHub Copilot

2 hours, 41 minutes average to complete the task

46% code written

Results are statistically significant (P<.0017) and the 95% confidence interval is [21%, 69%].
Accelerating AI Augmented Development
AI-Augmented Development promise
Scale of change will mean a long time for adoption, but opportunity to gain efficiencies is huge

Development Engineer
- 892 Users
- 16979 Commits
- *60M Lines Code Churn

Test Engineer
- 828 Users
- 20602 Commits
- *109M Lines Test Churn

*includes large 3rd party library updates
Accelerators/Inhibitors of AI-Augmented Development

**Inhibitors**
- Cultural resistance
- Inappropriate use
- Error-prone models
- Enterprise Data safety
- Licensing

**Accelerators**
- Additional code generation
- Reduction of repetitive tasks
- Resolution of high-level problems
- Faster, better testing

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Barriers to adoption: Data Safety
Azure/OpenAI shows promise

- Azure/OpenAI helps protect IP:
  - Pay as you go
  - Enterprise-level security
  - OpenAI models managed by MS/Azure

- How does it ensure data safety
  - Prompts are not used for model training
  - Prompts are not kept in Azure at all
Barriers to adoption: Legal and Regulatory

Be aware of emerging regulatory considerations

- Risk Analyses as Pre-requisite for GenAI use
  - Potential copyright infringement
  - Risk of loss of copyright (e.g. open source)
  - Need to protect confidential information
  - Unreliable or unlicensed output
  - Potential security concerns

- Evolving Legal and Regulatory Landscape
  - Numerous Proposed Legislations
  - Issuance of Executive Order on AI
  - Enactment of European Union AI Act
Future of software engineering
**AI-augmented development will shape next decade**

Future software engineer shifts focus to AI-first design principles and will have more time for creative work.
Thank you

“Let machines be machines and let humans be humans” - unknown